

LONG-TERM EVALUATION OF ACTIVATED CARBON INJECTION FOR MERCURY CONTROL UPSTREAM OF A COHPAC FABRIC FILTER

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ABSTRACT

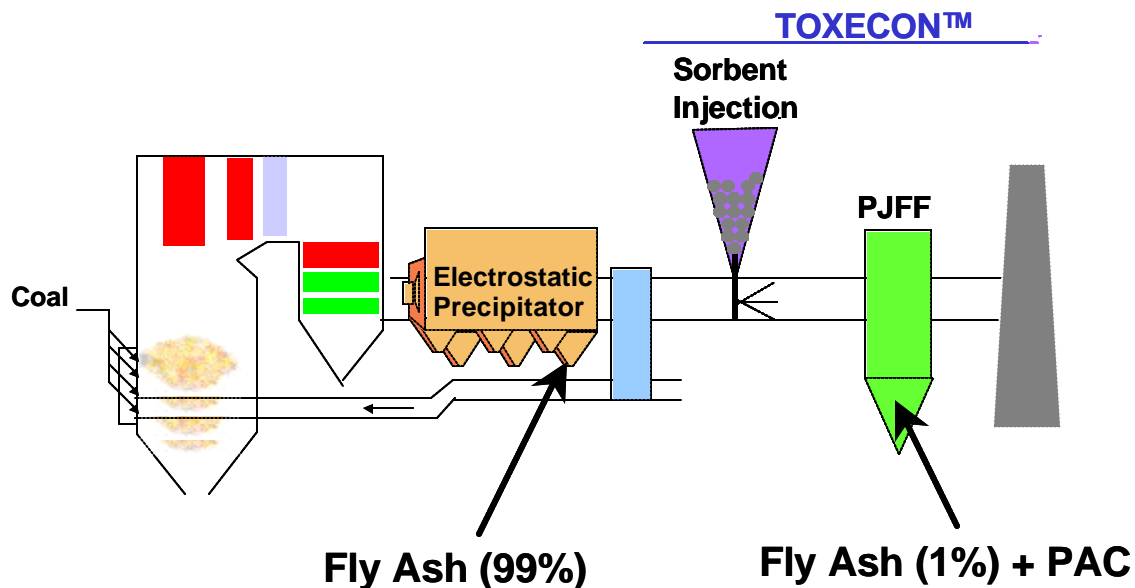
Injecting activated carbon upstream of a COHPAC fabric filter represents one of the most cost-effective approaches for reducing mercury emissions from coal-fired boilers. It can produce high levels of mercury reduction (up to 90%) at relatively low carbon feed rates (2-3 lb/MMacf) without contaminating the bulk of the ash. This paper will provide results from short-term tests conducted on coal-fired boiler flue gas and recent results from a yearlong test that began in March 2003. This new long-term program is being conducted by ADA-ES working in partnership with the Department of Energy National Technology Laboratory (NETL), EPRI and a number of power generators and vendors. These tests are being conducted on one-half of Alabama Power's E. C. Gaston Unit 3 COHPAC fabric filter. Results from a short-term test program at this site in 2001 showed high mercury removal efficiencies were possible, but operational restraints prevented running these conditions for extended periods and could not provide information on long-term impact on fabric filter performance. The current program will evaluate the long-term (~1 year) performance of activated carbon for mercury control and its effect on bag life, pressure drop and balance-of-plant equipment.

INTRODUCTION

Injecting a sorbent such as powdered activated carbon into the flue gas represents one of the simplest and most mature approaches to controlling mercury emissions from coal-fired boilers. The gas-phase mercury in the flue gas contacts the sorbent and attaches to its surface. The sorbent with the mercury attached is then collected by the existing particle control device, either an electrostatic precipitator (ESP) or a fabric filter (FF). The most commonly used sorbent for mercury control has been activated carbon.

One of the disadvantages of injecting activated carbon is its impact on the salability or reuse of ash. Tests have shown that the activated carbon interferes with chemicals used in making concrete. One straightforward, cost-effective approach to reducing mercury emissions without contaminating the fly ash is the use of the EPRI COHPACTM (COHPAC) and TOXECONTM (TOXECON) processes that are currently commercially available. COHPAC is an EPRI patented concept that places a high air-to-cloth ratio baghouse downstream of an existing ESP to improve overall particulate collection efficiency. The process becomes TOXECON when a sorbent such as activated carbon is injected upstream of the COHPAC baghouse located downstream of an ESP (Figure 1). With this configuration, the ash is collected upstream of the carbon injection and remains acceptable for sale. The downstream baghouse provides an effective control device for the activated carbon resulting in high levels of mercury control at relatively low sorbent injection rates.

Figure 1. TOXECONTM Mercury Control Configuration.



The advantages of the TOXECON configuration are:

- Sorbents are mixed with a small fraction of the ash (nominally 1%), which reduces the impact on ash reuse and waste disposal.
- Full-scale, short-term field tests have confirmed that COHPAC is capable of achieving up to 90% mercury control.
- Full-scale, short-term field tests have confirmed that fabric filters require only 10-20% of the sorbent required by ESPs to achieve similar removal efficiencies.
- Capital costs for COHPAC are less than other options such as replacing the ESP with a full-sized baghouse or larger ESP.
- Outage time can be significantly reduced with COHPAC systems in comparison to major ESP rebuilds/upgrades.

This paper will present results on short-term testing of the TOXECON process. A follow-on, long-term program will also be described to address issues uncovered during the earlier tests. Initial long-term results from tests being conducted at the Alabama Power Gaston plant are discussed.

NETL PHASE I TEST PROGRAM

Under a cooperative agreement from the Department of Energy National Energy Technology Laboratory (DOE/NETL), ADA-ES worked in partnership with PG&E National Energy Group (NEG), Wisconsin Energy Corp., Alabama Power Company, Ontario Power, TVA, First Energy, Hamon Research-Cottrell, Kennecott Energy, Arch Coal, Inc., and EPRI on a field test program of sorbent injection technology for mercury control. The test program, which took place at four different sites during 2001 and 2002, is described in detail elsewhere (Durham et al., 2001).

Four full-scale, short-term tests were conducted during 2001 and 2002. The first program was completed in the spring of 2001 at the Alabama Power E. C. Gaston Station (Bustard et al., 2002). This unit burns a low-sulfur bituminous coal and uses a hot-side ESP followed by a COHPAC baghouse as secondary collector for remaining fly ash and injected carbon. The second program was conducted during the fall of 2001 at the We Energies Pleasant Prairie Power Plant (PPPP) (Starns et al., 2002). This unit burns a subbituminous Powder River Basin (PRB) coal and uses an ESP to collect the carbon and fly ash. The third program was completed in the summer of 2002 at PG&E National Energy Group's Brayton Point Station (Durham et al., 2002). This unit burns low-sulfur bituminous coals and uses ESPs for particulate control. The fourth program was completed in the fall of 2002 at PG&E National Energy Group's Salem Harbor Station. Salem Harbor fires bituminous coals with an ESP for particulate control and a SNCR system for NO_x control.

Figure 2 presents results from the NETL full-scale tests. For the two ESP tests, one bituminous coal and the other a Powder River Basin (PRB) coal, mercury removal increases with increased rates of carbon injection. For the PRB coal, mercury removal was limited to 70% across the ESP. For the bituminous coal, mercury removal exceeded 90% at the highest

carbon injection rate. The results from the COHPAC test show that high mercury removal could be achieved at much lower injection rates than were necessary in the ESP tests.

One key component of the test program was to determine the impact of the activated carbon on fly ash. Initial testing with a PRB ash determined that the presence of even trace amounts of activated carbon in the ash rendered the material unacceptable for use in concrete. Even though the Pleasant Prairie (PRB) ash conformed to the ASTM C-618 standard for Class C fly ash, it did not pass the Foam Index test that is also required for sale of this ash for use in concrete formulation. These are field tests used to determine the amount of Air Entrainment Additives needed to meet freeze-thaw requirements. This means that with activated carbon injection, the plant would not only lose revenues from ash sales, it would incur additional expenses to landfill the material.

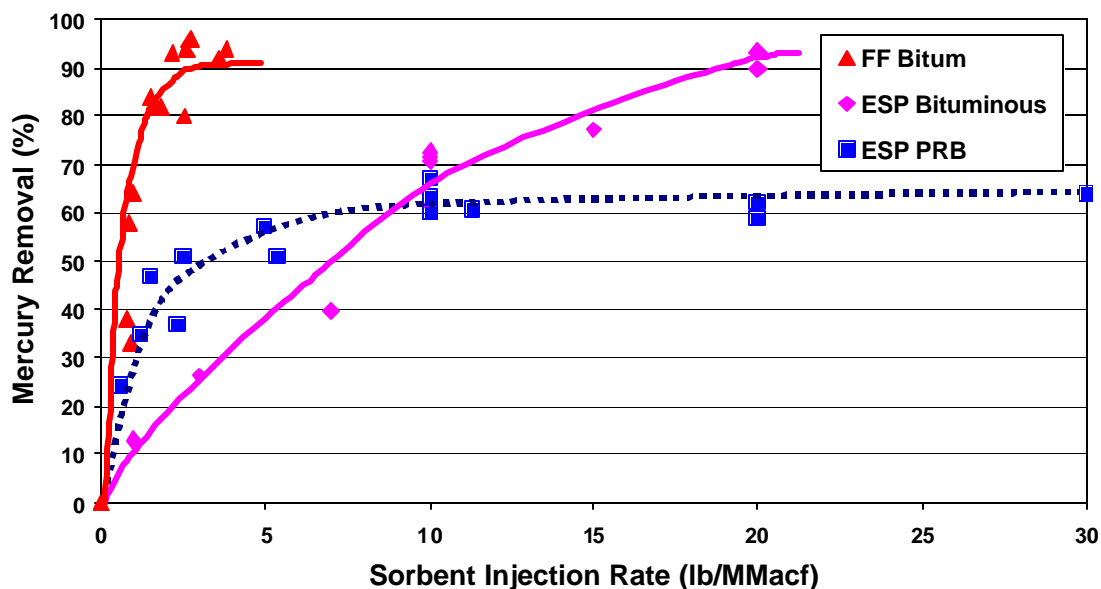


Figure 2. Mercury Removal Trends with Activated Carbon from NETL Phase I Test Program.

COHPAC Short-Term Filter Field Tests

The data in Figure 2 is a summary of the parametric test results from the Phase I test program with COHPAC. These removal efficiencies were measured using Semi-Continuous Mercury Analyzers (S-CEM) that measure total vapor-phase mercury. Figure 3 shows continuous mercury measurements made during one of the parametric test conditions while carbon was injected into COHPAC at Plant Gaston. As can be seen, the mercury levels downstream of COHPAC begin to decrease almost immediately in response to the injection of the sorbent. The mercury removal level increases as the carbon builds up on a fabric filter. After injection is stopped, mercury removal continues for a while as the carbon on the bags continues to capture mercury until all the carbon is cleaned from the bags.

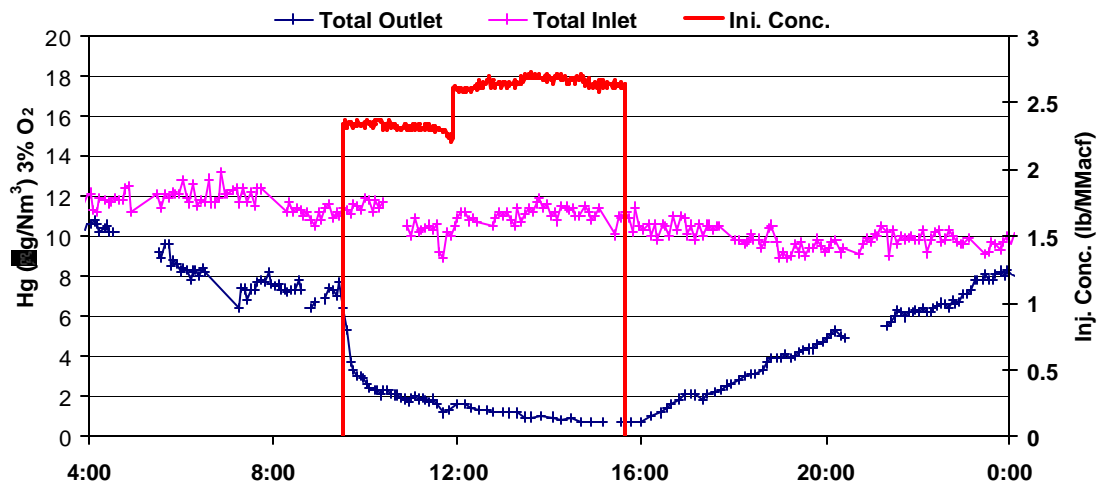


Figure 3. Mercury Reduction with Activated Carbon Injection Upstream of COHPAC, 2001.

One important consideration in the TOXECON process is the integration of the sorbent injection system with the fabric filter. This is important in the COHPAC configuration because the carbon represents a significant increase in the particle loading to the baghouse. Because of the strong relationship between pressure drop and particle loading, carbon injection at Gaston showed a linear increase in pulsing frequency with increased carbon injection rates (Figure 4). A pulse cleaning frequency of 1.5 p/b/h at this installation (with a rotating arm pulse jet type of filter) was considered to be the highest acceptable rate without significantly impacting bag life.

Therefore, it is important to take the carbon loading into account in the specification of a fabric filter for use in configuration. Bustard et al. (1997) developed an empirical model of COHPAC performance from data from existing COHPAC installations and pilot tests. Based on the model, it is recommended the baghouse be designed with a maximum air-to-cloth ratio of 6 ft/min.

The data presented in Figures 2 and 4 were the result of a series of six- to eight-hour tests. Longer-term testing at “optimum” plant operating conditions, as determined from these short duration tests, was also conducted to document:

- Mercury removal efficiency over time;
- The effects on COHPAC and balance of plant equipment from sorbent injection; and
- Operation of the injection equipment to determine the viability and economics of the process.

During the longer-term tests, carbon was injected continuously 24 hours per day, for 9 days. Based on results from the parametric tests, injection rate was determined taking into consideration both mercury removal and the projected increase in COHPAC cleaning frequency. An injection concentration of 1.5 lbs/MMacf was chosen to maintain COHPAC cleaning frequency below 1.5 p/b/h.

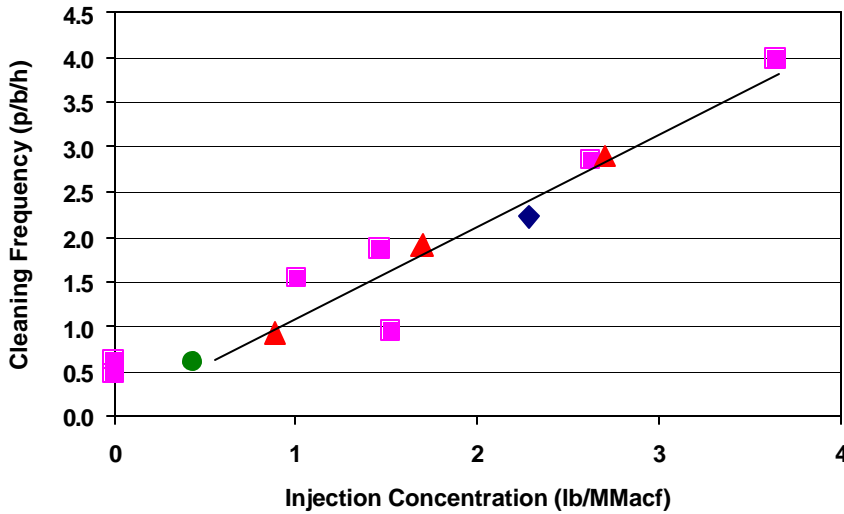


Figure 4. COHPAC Cleaning Frequency in Pulses/Bag/Hour as a Function of Activated Carbon Injection Concentration (rotating arm pulse jet type of filter).

Ontario Hydro measurements were conducted during the longer-term tests. As can be seen in Table 1, the activated carbon is effective for both vapor-phase species, even the more difficult to capture elemental mercury.

Table 1. Average Mercury Removal Efficiencies Across COHPAC as Measured with Ontario Hydro Method.

Sampling Location	Particulate (mg/dncm ¹)	Oxidized (mg/dncm ¹)	Elemental (mg/dncm ¹)	Total (mg/dncm ¹)
COHPAC Inlet	0.2	6.4	4.6	11.2
COHPAC Outlet	0.1	0.9	0.0	1.1
Removal Efficiency (%)	50	86	99	90

Normal: T = 32°F

Figure 5 presents inlet and outlet mercury concentrations as measured by the S-CEMs, boiler load, and activated carbon injection concentration during the last 5 days of the long-term test. Periods when Ontario Hydro measurements were made are also identified. The S-CEMs indicate that mercury removal was nominally 87, 90, and 88% during the Ontario Hydro tests. This correlates well with the manual measurements. However, it is important to note that the S-CEMs showed that the average mercury removal efficiency over the multi-day time period was 78%, with variations between 36% to over 90%. This difference is probably due to varying coal and operating conditions over time. Figure 5 also shows that during this 5-day period, inlet mercury concentration varied by nearly a factor of five. Outlet concentrations can be seen to follow the inlet and there are times during these transitional periods when removal efficiencies are fairly low. During the period when the Ontario Hydro tests were run, inlet mercury levels were low and fairly steady. These tests were conducted under ideal conditions and may show the best-case condition for mercury control at this injection rate.

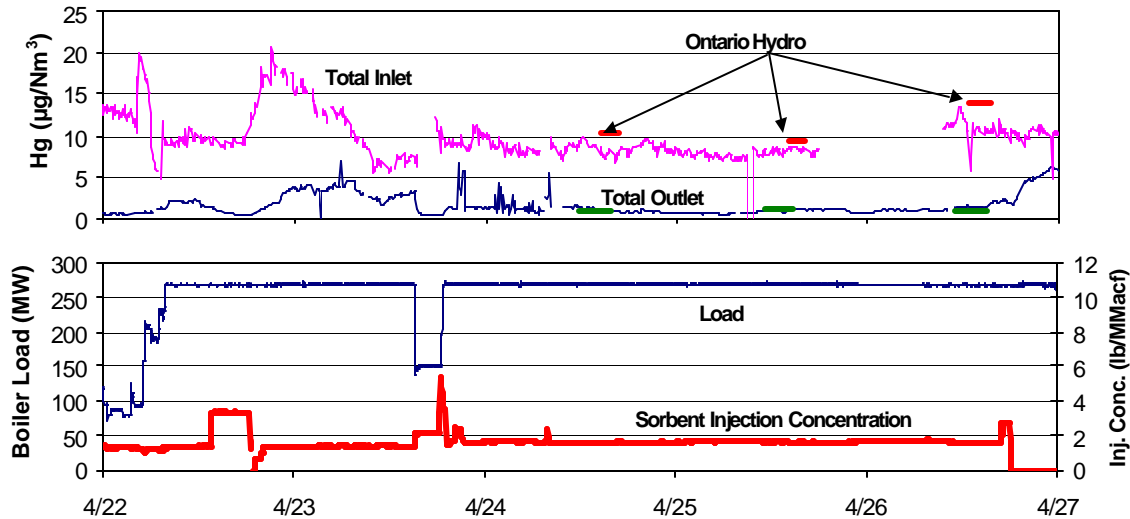


Figure 5. Inlet and Outlet COHPAC Mercury Concentrations, Boiler Load and Activated Carbon.

Preliminary Cost for Activated Carbon Injection at Gaston

The estimated uninstalled cost for a sorbent injection system and storage silo for the 270 MW Unit 3 is \$575,000 \pm 30%. Sorbent costs were estimated for nominally 80% mercury control based on the long-term activated carbon injection concentration of 1.5 lbs/MMacf. For Gaston Unit 3, this would require an injection rate of nominally 80 lbs/h. Assuming a unit capacity factor of 80% and a delivered cost of \$0.50/lb for activated carbon, the annual sorbent cost for injecting activated carbon into the existing COHPAC baghouse would be about \$300,000.

Long-Term TOXECON Field Test at E. C. GASTON Station

As with all other air pollution control technologies, sorbent-based mercury control is a developing technology that needs to go through a phased approach as it matures to become accepted as commercially viable. The results of the first field test program at Gaston provided a good indication of the capabilities and limitations of the TOXECON technology for controlling mercury. However, the tests were performed for a limited amount of time (< 200 hours of continuous operation) and did not allow for a thorough operational analysis of the use of this technology for mercury control. In the fall of 2002, ADA-ES was selected by the DOE to continue to mature the technology and conduct a long-term test program at the Gaston Station.

This program provides the first opportunity to evaluate ACI in the TOXECON configuration for a year of operation. Although new TOXECON units may be designed more conservatively, important long-term operating data will be obtained through this test. The yearlong-term mercury control testing will provide data to assess the operational impacts to

COHPAC and the ability to effectively control mercury over varying operational and seasonal conditions. Technical and financial support on this program will be provided to ADA-ES by Southern Company and Alabama Power, the Electric Power Research Institute (EPRI), Allegheny Energy, Arch Coal, Inc. (ACI), First Energy, Hamon Research-Cottrell, Ontario Power Generation, Duke Power and TVA.

Description of the Test Site

The E. C. Gaston Electric Generating Plant, located in Wilsonville, Alabama, has four 270 MW balanced draft and one 880 MW forced draft coal-fired boilers. All units fire a variety of low-sulfur, washed, Eastern bituminous coals.

The primary particulate control equipment on all units are hot-side ESPs. Units 1 and 2 and Units 3 and 4 share common stacks. In 1996, Alabama Power contracted with Hamon Research-Cottrell to install COHPAC downstream of the hot-side ESP on Unit 3. This COHPAC system was designed to maintain Unit 3 and 4's stack opacity levels below 5% on a 6-minute average.

The COHPAC system is a hybrid pulse-jet type baghouse, designed to treat flue gas volumes of 1,070,000 acfm at 290°F (gross air-to-cloth ratio of 8.5 ft/min with on-line cleaning). The COHPAC baghouse consists of four isolatable compartments; two compartments per air-preheater identified as either A- or B-Side. Each compartment consists of two bag bundles, each having a total of 544, 23-foot long, polyphenylene sulfide (PPS) felt filter bags, 18 oz/yd² nominal weight. This results in a total of 1,088 bags per compartment, or 2,176 bags per casing. The evaluation was conducted on one-half of the gas stream, nominally 135 MW. The side chosen for testing was B-Side. A-Side was monitored as the control unit.

The hot-side ESP is a Research-Cottrell weighted wire design. The specific collection area (SCA) is 274 ft²/1000 acfm. Depending on the operating condition of the hot-side ESP, nominally 97 to 99+% of the fly ash is collected in the ESP. The remaining fly ash is collected in the COHPAC system. Hopper ash from both the ESP and baghouse is sent to a wet ash pond for disposal.

Activated Carbon Injection Equipment

The carbon injection system consists of a bulk-storage silo and twin blower/feeder trains each rated at 750 lb/hr. Activated carbon is delivered in bulk pneumatic trucks and loaded into the silo, which is equipped with a bin vent bag filter. From the two discharge legs of the silo, the reagent is metered by variable speed screw feeders into eductors that provide the motive force to carry the reagent to the injection point. Regenerative blowers provide the conveying air. A PLC system is used to control system operation and adjust injection rates. Piping carries the reagent from the feeders to distribution manifolds located on the ESP inlet duct, feeding the injection probes. Each manifold supplies up to six injectors.

Figure 6 is a diagram of the location of the various components of the air pollution control train, the carbon injection location and the extraction points for the mercury S-CEM measurements.

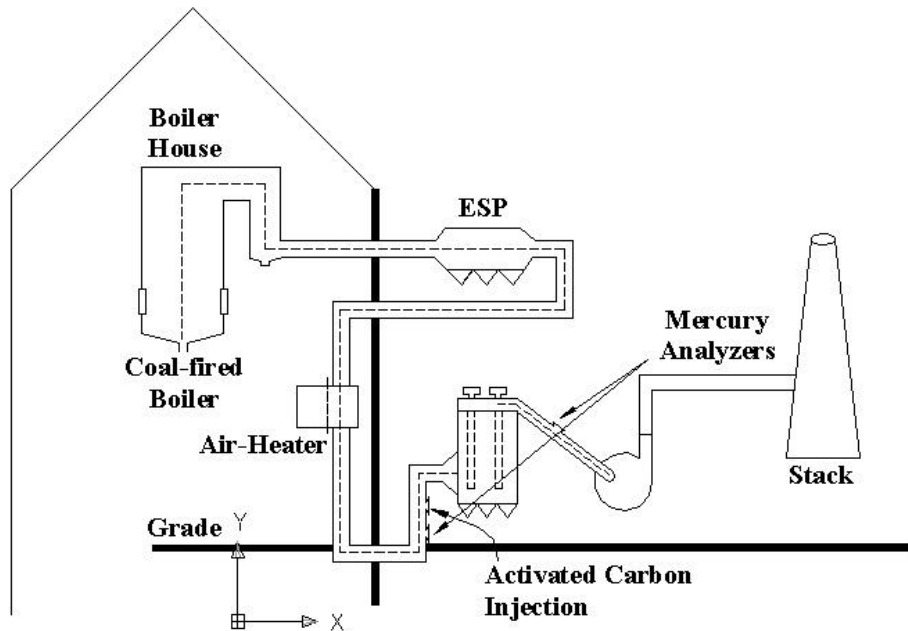


Figure 6. Flow Schematic of Gaston Unit 3, Showing Injection and Measurement Locations.

Test Program

The objective of this program is to conduct a longer-term (approximately one year) demonstration of TOXECON (sorbent injection into COHPAC) for power plant mercury control that will yield data on operability, maintainability, reliability, balance-of-plant impacts, and costs.

The yearlong test program has four major tasks, which are briefly described below:

1. Design and install an activated carbon injection system capable of continuous operation for up to one year.
2. Install a mercury analyzer capable of long-term, continuous operation. This analyzer is referred to as semi-Continuous Emissions Monitor (S-CEM).
3. Evaluate the long-term performance of carbon injection upstream of COHPAC for mercury control. The first test (up to six months) will be conducted using the existing set of bags. In the second phase (up to six months), a set of new bags made from advanced fabrics will be tested.
4. Perform short-term tests of alternative sorbents.

The first month of operation will be devoted to measuring baseline conditions and integrating the injection and mercury measurement systems with COHPAC and normal plant operation. Carbon injection concentration will be optimized taking into consideration how COHPAC

pressure drop and performance of the upstream ESP varies. Feedback control may be required in order to vary the injection concentration to maintain an acceptable cleaning frequency. This will be followed by up to 6 months of continuous injection and mercury removal monitoring. This series of tests will be conducted on the existing 2.7-denier bags.

A key parameter to be evaluated during the test program is fabric used to make the filter bags. The OEM fabric for the four COHPAC baghouses in the U.S. (Gaston Units 2 and 3 and Big Brown Units 1 and 2) was a 2.7 denier RytonTM felt. Denier is a measure of the linear density of a fiber and provides an indication of the cross section or thickness of the fibers.

EPRI has invested significant resources to develop a fabric that has inherently higher permeability and therefore lower pressure drop. This fabric is of interest at Gaston because the major impact on COHPAC from earlier short-term sorbent injection testing was an increase in cleaning frequency, or equivalent pressure drop. This high-permeability fabric may reduce the impact of the increased mass loading on pressure drop and allow for either higher injection rates or less performance degradation over time.

A second long-term test is planned with a set of the new, high-perm (7-denier Torcon) bags. All of the 2.7-denier bags in the B-Side baghouse will be replaced the high-perm bags. Baseline measurements will be made for up to a period of one month to fully understand COHPAC performance with the new, high-perm bags. Carbon injection concentration will again be optimized followed by continuous carbon injection, again for up to 6 months.

Operational trends will be monitored using the existing system supplied by Southern Research Institute. Performance variables that will be monitored continuously include pressure drop, cleaning frequency, inlet grain loading, flow, and outlet opacity. Periodically bags will be removed to measure bag strength.

Coal and ash samples will be collected and select samples will be analyzed. Tests will include ultimate and proximate, mercury and chlorine measurements of the coal, and mercury and LOI measurements of the ash.

This long-term test at Gaston provides an opportunity to evaluate other mercury control sorbents that may have advantages in cost and/or performance. The test plan has time set aside at the end of the long-term test to evaluate alternative sorbents.

Baseline Results

A series of baseline tests, no activated carbon injection, were conducted in March and May 2003. The baseline tests were planned to gather operating performance data of the COHPAC baghouse, and to measure mercury at the inlet and outlet of COHPAC under normal operating conditions. Coal and ash samples were also collected during this period.

COHPAC Performance

At Gaston, the primary variable used to track COHPAC performance is cleaning frequency. The cleaning logic is set to begin a clean at a specified pressure drop/drag set-point. COHPAC cleaning frequency in pulses/bag/hour (p/b/h) during the first baseline period can be seen in Figure 7. On average the baseline cleaning frequency was about 1.8 p/b/h, with periods of continuous cleaning at 4.3 p/b/h. It is worth noting that the maximum allowable cleaning frequency during the Phase I tests was 1.5 p/b/h. This presented a challenge to the test plan because adding carbon to the baghouse would further increase cleaning frequency.

Inlet loading to COHPAC is measured with a BHA Particulate Monitor. Particulate loading on the 3B side during baseline varied from a low near 0.025 gr/acf to nearly 0.2 gr/acf, with an average loading of 0.054 gr/acf. This also can be seen in Figure 7. As would be expected, inlet loading has a direct impact on cleaning frequency. It is believed that the high inlet loading, which causes high cleaning frequency, occurs when certain coals are burned, resulting in less efficient ESP performance and higher mass loading to COHPAC.

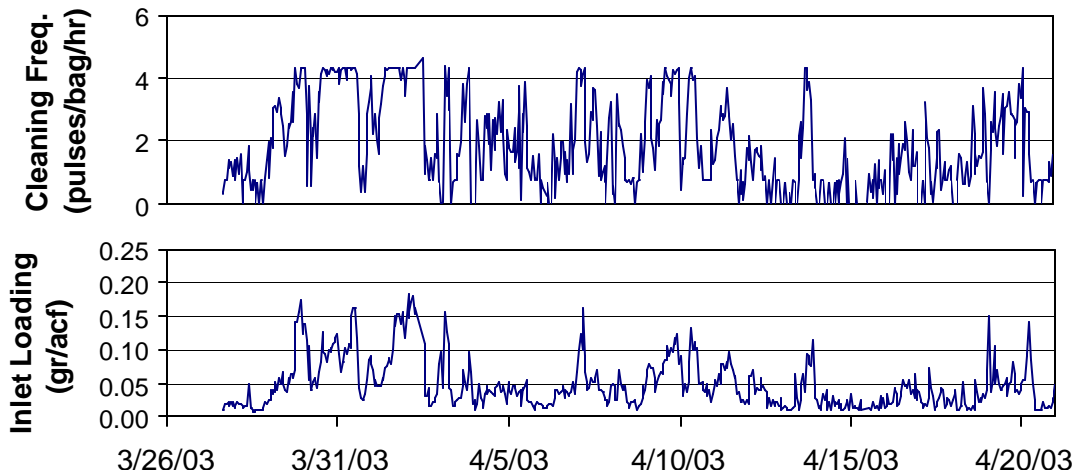


Figure 7. COHPAC cleaning frequency and inlet mass loading during baseline tests 2003.

Mercury Measurements

Continuous total vapor-phase mercury was measured at the inlet and outlet of Unit 3B COHPAC with the on-site S-CEM on working days, Monday through Friday. A set of Ontario Hydro measurements for total mercury was also conducted.

The mercury analyzer was set to alternately measure at the inlet and outlet with approximately 10 samples at each location. Data from the first baseline period are shown in Figure 8. The top graph presents inlet and outlet mercury concentrations; the second graph presents calculated mercury removal efficiency. Figure 8 shows:

- Over the nearly 5-week baseline period, inlet mercury varied between nominally 7 and 18 $\mu\text{g}/\text{Nm}^3$. This is similar to variations seen during the Phase I tests.

- Outlet mercury varied between nominally 1 and 18 $\mu\text{g}/\text{Nm}^3$, with mercury removal efficiencies varying between 0 and 90%. This was certainly not what was seen in Phase I, where baseline S-CEM measurements showed very little, if any, mercury removal.
- Often, higher mercury removal efficiencies could be correlated to periods of high cleaning frequencies.

Results from Ontario Hydro measurements conducted on April 2 and 3 are presented in Table 2. These results include speciated mercury concentrations for each of the three runs at the inlet and outlet, corresponding removal efficiencies, and averages from the three runs. In summary:

- Inlet mercury varied between 15.6 and 19.5 $\mu\text{g}/\text{Nm}^3$. Outlet mercury varied between 11.8 and 15.1 $\mu\text{g}/\text{Nm}^3$.
- For the individual runs, mercury removal efficiency varied from nominally 5 to 39%.
- On average, there was 26.3% mercury removal across the COHPAC baghouse. In the Phase I tests, average baseline mercury removal was 0%.
- At the inlet, 64.4% of the mercury measured was oxidized, 27.5% was elemental, and 8.2% was particulate. At the outlet, nearly all of the mercury, 92.0%, was in the oxidized form.
- As with previous tests, the results show little or, in this case, negative removal of oxidized mercury. This is probably due to oxidation of elemental mercury as it passes through the baghouse.

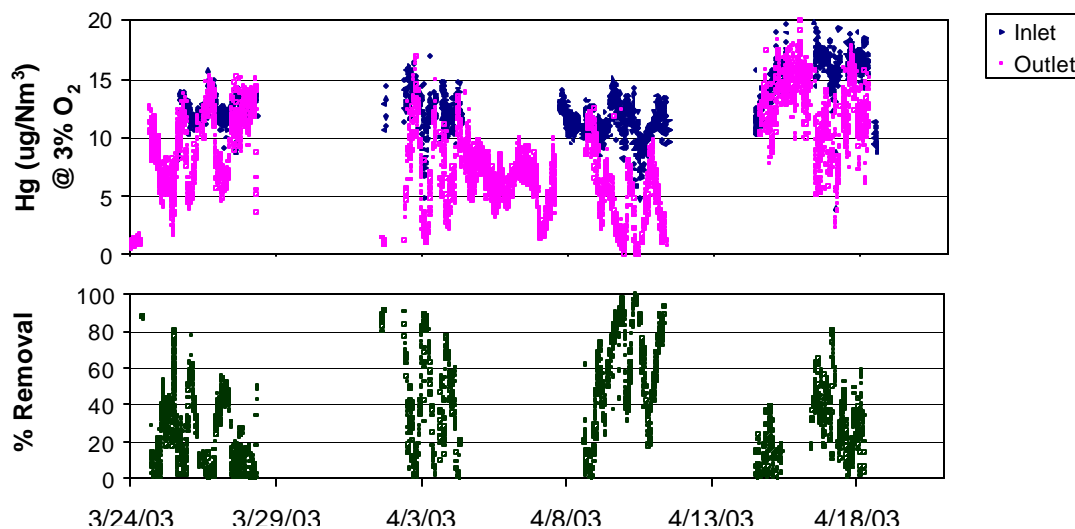


Figure 8. Baseline inlet and outlet mercury concentrations and calculated mercury removal efficiencies across COHPAC 2003.

Table 2. Results from Baseline Testing Series without Sorbent Injection – Gaston Unit 3B COHPAC April 2003 (all mercury measurements in (mg/Nm³) and corrected to 3% O₂).

Location	Particle Bound	Oxidized Hg ²⁺	Elemental Hg ⁰	Total, Hg
Inlet – Run 1	2.6	10.4	4.2	17.2
Outlet – Run 1	0.05	10.7	1.0	11.8
RE (%) Run 1				31.4
Inlet – Run 2	1.2	13.4	5.1	19.5
Outlet – Run 2	0.02	11.1	0.8	12.0
RE (%) Run 2				39.0
Inlet – Run 3	0.57	10.2	5.2	15.6
Outlet – Run 3	0.09	13.9	1.1	15.1
RE (%) Run 3				5.3
Average Values				
Inlet	1.4	11.3	4.8	17.6
Outlet	0.05	11.9	0.99	13.0
RE (%)	96.3	-5.4	79.6	26.3
% of Total Inlet	8.2	64.4	27.5	
% of Total Outlet	0.4	92.0	7.6	

	1Q03	2Q03	3Q03	4Q03	Status
Installation & Start-Up					✓
Baseline Period 1					✓
Optimization Period 1					✓
Baseline Period 2					✓
Optimization Period 2					✓
Original Bag Test					In Progress

Figure 9. Actual Gaston long-term test project schedule through August 2003.

Long-Term Test Status

By August 2003, nearly four months of continuous carbon injection have been completed, including two baseline and optimization tests. The original schedule was modified to better understand and document new baseline conditions and to develop an acceptable approach to

injection activated carbon. Figure 9 presents an updated task schedule for activities being conducted in this test. Currently the test is in the 6-month, original bag test.

Currently, activated carbon injection is being controlled using a feedback system that sets carbon feedrate based on inlet mass loading. During periods of high inlet loading, carbon injection is turned off. As seen in the baseline data, Figure 8 mercury removal is often fairly high during periods of high inlet mass loading, so overall mercury removal is not significantly impacted during these non-injection periods. It is expected that operation will continue in this mode until mid-September.

CONCLUSIONS

Short-term tests have indicated that injecting activated carbon upstream of a COHPAC fabric filter offers one of the most efficient and cost-effective approaches for reducing mercury emissions from coal-fired boilers. This combination of activated carbon and COHPAC represents the EPRI patented TOXECON process, and has the additional benefit of minimizing the impact on fly ash and its subsequent reuse. Short-term, full-scale tests produced mercury removal rates for a bituminous coal as high as 90% at feed rates 10-20% lower than that required for an ESP.

ADA-ES is currently involved in two programs to further advance this technology. The program being conducted at the Alabama Power Gaston Station will provide one year of operational data on a bituminous coal. Preliminary baseline results show:

- Baseline (no activated carbon injection) COHPAC cleaning frequency is much higher than Phase I tests. Higher cleaning frequency is caused by higher inlet mass loading.
- Baseline mercury removal is much higher than seen in the Phase I tests and varies between 0 and 90%.
- At the same site, baseline or “native” mercury removal can change significantly over time. These changing conditions will require both contingency and flexibility in the design of the mercury control system.

The CCPI program at We Energies Presque Isle station will demonstrate the technology on a PRB coal. This program will provide several years of operating data and represents a key step in the commercialization process. Results from both of these programs will provide significant benefit to all future potential users of the technology.

NEXT STEPS: WE ENERGIES PRESQUE ISLE POWER PLANT TOXECON PROJECT

A We Energies proposal was selected under the DOE Clean Coal Power Initiative (CCPI) to design, install, evaluate and operate an integrated emissions control system for mercury and particulate matter that will treat the flue gases of three 90 MW subbituminous coal-fired units. This will be the nation’s first application of TOXECON technology designed for

activated carbon injection and mercury control on a coal-fired utility boiler. It also represents the first COHPAC or TOXECON technology on a unit firing a PRB coal.

The project will take place at We Energies' Presque Isle Power Plant located in Marquette, Michigan. Units 7, 8, and 9 are each 90 MW with individual hot-side ESPs as the primary particulate control device. The proposed project involves controlling the emissions from the three units using a single, TOXECON baghouse island.

Operating and performance data from the Gaston long-term evaluation will be incorporated into the design of the new TOXECON system at Presque Isle, especially performance data from the high-perm bag test.

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